

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Susumu HASHIMOTO et al.

Serial No.: 09/146,222

Group Art Unit: 2754

filed: September 2, 1998

Examiner: Korzuch

For: MAGNETORESISTANCE EFFECT ELEMENT WITH IMPROVED  
ANTIFERROMAGNETIC LAYER

DECLARATION UNDER 37 C.F.R. 1.132

Honorable Commissioner of  
Patents and Trademarks  
Washington, D.C. 20231

Sir:

I, Hitoshi IWASAKI, a national of Japan, declare as follows.

I am a co-applicant of the above-identified application.

The following Experiments were conducted by me or under  
my direct supervision:

Experiments

On an alumina-coated silicon substrate, a Ta film  
(thickness: 5 nm), a NiFe film (thickness: 7 nm), a CoFe film  
(ferromagnetic film; thickness: 1 nm), a Cu film (nonmagnetic  
film; thickness: 3 nm), a CoFe film (ferromagnetic film;  
thickness: 2 nm), an antiferromagnetic film (thickness: 13-30  
nm), and a Ta film (thickness: 5 nm) were sequentially formed  
by DC magnetron sputtering to form a spin valve  
magnetoresistance effect element. The antiferromagnetic film  
was formed by using a target of Pt<sub>45</sub>Mn<sub>55</sub>, Ni<sub>46</sub>Mn<sub>54</sub> or Fe<sub>50</sub>Mn<sub>50</sub>.

The element, thus formed, was annealed at  $250^{\circ}\text{C}$  for 10 hours, and then was measured for the magnetoresistance (MR) ratio (%) by a four-point probe method under a magnetic field of  $\pm 600$  Oe. The results are shown in the table below.

Antiferromagnetic Film	MR Ratio
Pt <sub>45</sub> Mn <sub>55</sub> (Thickness: 30nm)	7%
Ni <sub>46</sub> Mn <sub>54</sub> (Thickness: 30 nm)	3.7%
Fe <sub>50</sub> Mn <sub>50</sub> (Thickness: 13 nm)	3.9%

I, the undersigned, declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Cord and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date:

Oct 6, 1999



Hitoshi IWASAKI